

Hyper.X™ Reader LMB6023-X2

Ex nA II T4



User Manual

Ref: MU-LMB6023 X2-V1.0-GB

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PREFACE

Purpose of this manual

This manual presents the BALOGH LMB6023-X2 equipment.

It then indicates how to install it and how to use it.

The interfacing manual for the Hyper X (ref 13053/104) readers complete the information relating to the interfaces given in this manual.

The Safety Instructions for the Hyper X LMB 6023-X2 (ref 13523/52) complete the information relating to the installation given in this manual.

Reference of the manual

The manual's generic reference is:

MU- <name of equipment> -II-L

in which:

MU denotes User Manual

II is the version number.

L is the language in which the manual is written

Update

| Version no. | Date | Nature of the modification |
|-------------|------------|----------------------------|
| 1.0 | 11/20/2008 | Creation |
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Note

The information contained in the present manual may be modified without prior notice.

The company BALOGH cannot be held responsible for the consequences of any errors or omissions, or for the erroneous interpretation of the information.

1 PRESENTATION

The LMB_6023-X2 reader is a standard monobloc reader integrated in a case adapted for ATEX applications. It is presented in the form of a polycarbonate case with a compression gland cable entry device.



LABELLING:

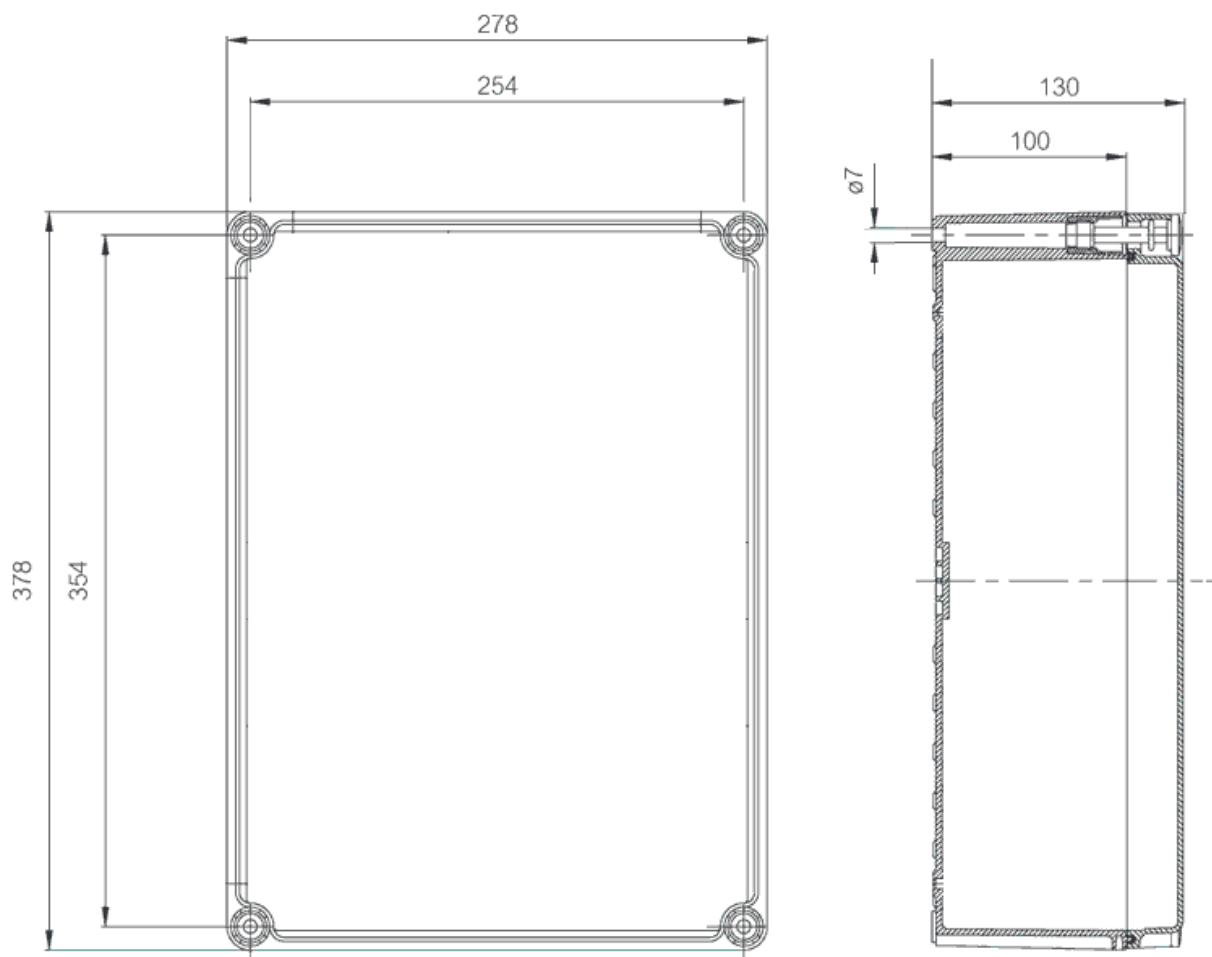


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2 DESCRIPTION

2.1 EXTERNAL DESCRIPTION

The LMB_6023-X2 is a monoblock reader consisting of an LMB_7023 reader inside a casing adapted for ATEX applications.



The LMB_6023-X2 reader is a compact reader. It comes in the form of a ATEX certified polycarbonate casing unit without halogen:

- External dimensions: 278x378x130mm +/-1mm
- Mounting dimensions: 254x354mm +/- 1mm – 4 holes of Ø7mm
- Weight: 5.1Kg
- Colour: Grey RAL 7035
- Mechanical resistance: see manufacturer's documentation (FIBOX ref. FEX 3828 13 G)
- Protection IP66/67
- Protection ATEX : Ex II 3G - Ex II nA T4 in accordance with standard EN 60079-15
- Power supply: Between +12VDC and +24VDC, max. current 1.5A.
- Operating temperature: -10°C / +50°C

The LMB 6023-X2 casing is composed of

| | Manufacturer | Manufacturer's reference |
|-------------------|--------------|--------------------------|
| Cover | FIBOX | FEX 3828-13G |
| Casing base | FIBOX | PC-3828 + machining |
| Compression Gland | FIBOX | SS 10256 |

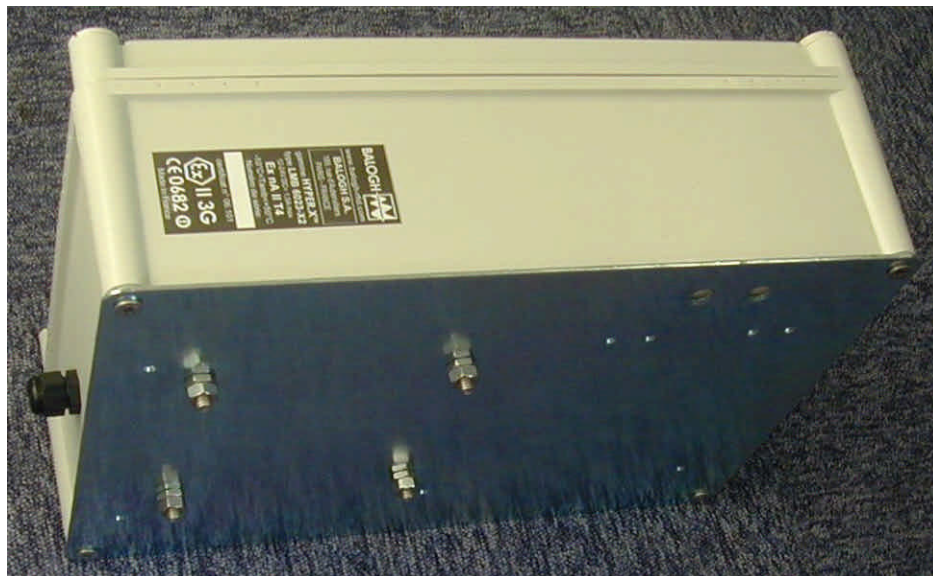
The reader has an ATEX certified compression gland which can take a cable with a diameter of between 5.5 mm and 10 mm. The cable is not supplied.



Compression Gland
detail



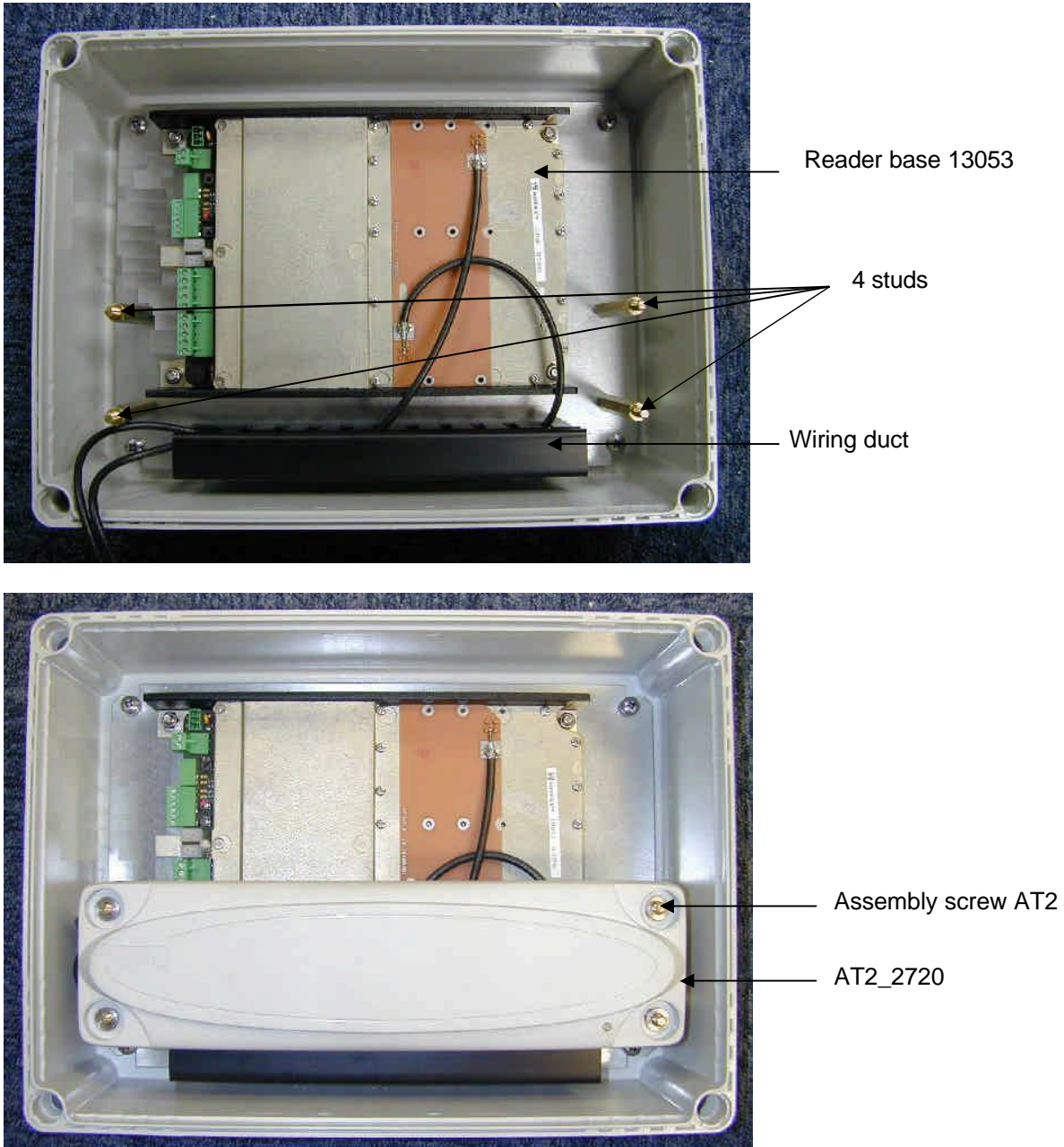
Four screws are available in the back plate of the casing for fixing the swivel support given.



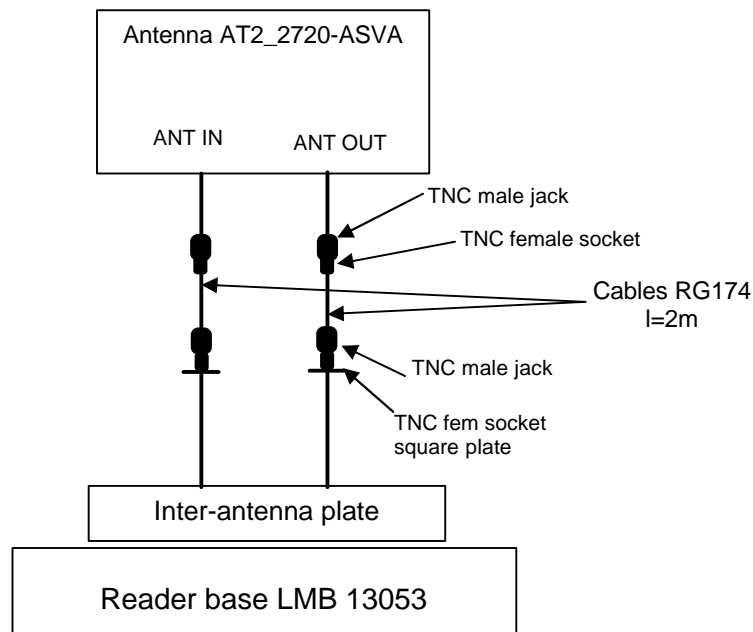
2.2 INTERNAL DESCRIPTION OF THE READER CASING

The LMB_6023-X2 reader consists of:

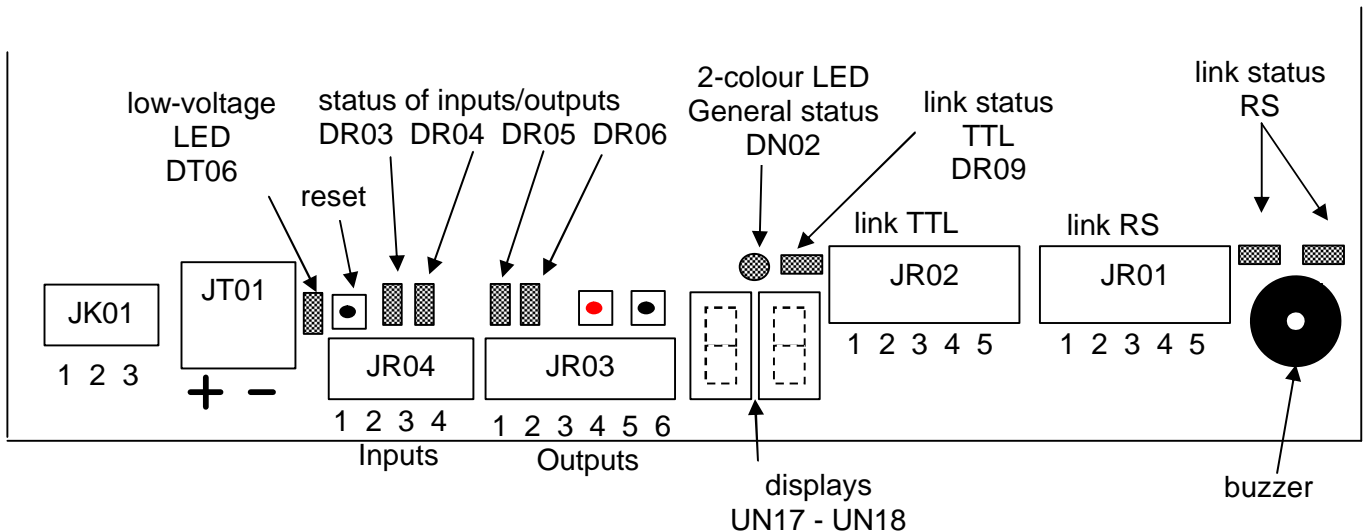
- A polycarbonate ATEX Certified casing ATEX without halogen with a base plate
- A standard reader base 13053, with an inter-antenna panel, type ASVA
- A standard AT2_2720 antenna assembled on 4 studs h=70 mm
- Two coaxial cables TNC fem / TNC male to link the antenna to the coaxial cables TNC male of the inter-antenna panel
- A wiring duct 25x50x240 mm to hold the cables



Internal connection for the antenna



User-machine interface of the reader base control panel



The principal control features are

- a 2-colour led (DN02) indicating the status of the reader and the presence of one or more tags,
- a buzzer that sounds when a tag is detected (if activated),
- a reset push button (black),
- a control panel consisting of two 7-segment displays (UN17-UN18) and two push buttons

3 CONFIGURATION OF THE READER

ATTENTION: This operation requires opening of the case and must therefore not be performed in a sensitive zone. Refer to the Safety Instructions for the Hyper X LMB 6023-X2 (ref 13523/52).

3.1 ACCESS TO THE CONTROL PANEL

Remove the cover of the casing to access the reader base and the antenna.

3.2 USE OF THE CONTROL PANEL

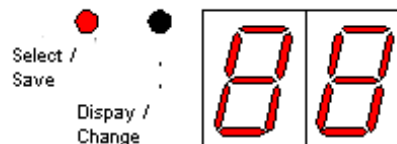
Role of the buttons

Red button

- select a parameter
- save the modified parameter

Black button

- displays the value of the selected parameter
- selects the value of the chosen parameter



To display the parameter you want, press the red button until the corresponding mnemonic is displayed (cyclical display).

To display the value of this parameter, press the black button until the mnemonic displayed corresponds to the desired value (cyclical display).

Press the red button again to save this value (during the save, "SA" is displayed for 1 second).

To sum up, starting from a given status and, depending on the button chosen, the effects are as follows

| status | | press button | consequence |
|---------------------------------|---|--------------|--|
| display off | ↗ | red | displays mnemonic of 1 st parameter |
| | ↘ | black | nil |
| display mnemonic of parameter n | ↗ | red | displays mnemonic parameter n+1 |
| | ↘ | black | displays value parameter n |
| display value of parameter n | ↗ | red | displays mnemonic parameter n+1 |
| | ↘ | black | displays next value + "." |
| display value + "." | ↗ | red | displays "SA", save |
| | ↘ | black | displays following value + "." |

Notes:

1. If you do not want to save a modified parameter

- wait until the 8 second time out is up
- OR press the Reset button

2. By default, the display units are read vertically, with the led underneath.

If the reader must be assembled with the led uppermost, the read direction can be inverted by changing the first parameter. In this case, the black and red buttons retain their functions.

3. The display sequence of the black and red buttons is cyclical.

The successive parameters are obtained either by briefly pressing the button, or by keeping it pressed down, which will make the parameters scroll down every 0.3 s.

4. To return to the default values (ex-factory) press simultaneously on the Reset button and the Change button (black).

3.3 ADJUSTABLE PARAMETERS

The parameters are displayed in the order that follows and are saved in non-volatile memory (see Appendix for the configuration of the application):

| n° | Parameter | Mnemonic | Value | Visible value |
|----|----------------------|----------|--------------|---------------|
| 1 | Display direction | -- | 0 | uP |
| | | | 1 | dn |
| 2 | Channel number | nC | 0 à 31 | 0 à 31 |
| 3 | Reread time | tP | 0,1 s | 0 |
| | | | 0,5 s | 1 |
| | | | 1 s | 2 |
| | | | 2 s | 3 |
| | | | 5 s | 4 |
| | | | 10 s | 5 |
| 4 | Buzzer | bu | OFF | oF |
| | | | ON | on |
| 5 | Int code filtering | FI | néant | 0 |
| | | | 1er code | 1 |
| | | | EEPROM | 2 |
| 6 | Integrator code size | tC | 3 | 3 |
| | | | 4 | 4 |
| 7 | Antenna read LED | LE | normal | oF |
| | | | autre | on |
| 8 | Type of functioning | tF | 0 | 0 |
| | | | 1 | 1 |
| | | | 2 | 2 |
| | | | 3 | 3 |
| 9 | Function tags | bF | OFF | oF |
| | | | ON | on |
| 10 | Journal | Jo | aucun | oF |
| | | | 1 | 1 |
| | | | 2 | 2 |
| | | | 3 | 3 |
| 11 | Type of RS interface | tA | RS 232 | 23 |
| | | | RS 422 | 42 |
| | | | RS 485 | 48 |
| | | | | |
| 12 | Type of CO interface | tO | inutilisé | nu |
| | | | ISO2 fixe | IF |
| | | | ISO2 var | Ir |
| | | | WIEGAND | IE |
| 13 | JBUS Adresse | Ad | 1, 2, ...,31 | 1 à 31 |
| 14 | Rate | br | 9 600 | 96 |
| | | | 4 800 | 48 |
| | | | 1 200 | 12 |
| | | | 19 200 | 19 |

| n° | Parameter | Mnemonic | Value | Visible value |
|----|---------------------|----------|-----------------------|---------------|
| 15 | Character format | Fo | 8 bits/without parity | 8n |
| | | | 7 paired bits | 7P |
| | | | 7 unpaired bits | 7I |
| 16 | Frame type | Fr | ASCII | AS |
| | | | code alone | CS |
| | | | Format_td | td |
| | | | JBUS | Jb |
| 17 | Polling/Interr | Po | Interrupt | oF |
| | | | Polling | on |
| 18 | MTBM | tb | 0,1 s | 0 |
| | | | 0,2 s | 1 |
| | | | 0,5 s | 2 |
| | | | 1 s | 3 |
| | | | 2 s | 4 |
| 19 | No of transmissions | nE | 1 to 4 | 1 à 4 |
| 20 | Output 1 | S1 | not used | oF |
| | | | buzzer copy | 1 |
| | | | 2s read | 2 |
| | | | host | 3 |
| | | | green LED | 4 |
| 21 | Output 2 | S2 | not used | oF |
| | | | vehicle BF | 1 |
| | | | pile badge basse | 2 |
| | | | host | 3 |
| | | | red LED | 4 |
| 22 | Range | Pr | 0 to 3 | 0 à 3 |
| 23 | Reserved | | | |
| 24 | Entry 1 | E1 | inactive | oF |
| | | | read | on |
| 25 | Entry 2 | E2 | inactive | oF |
| | | | opening | on |
| 26 | Reserved | | | |
| 27 | Period of hops | PE | 100 ms | 0 |
| | | | 150 | 1 |
| | | | 200 | 2 |
| | | | 300 | 3 |
| | | | 400 | 4 |
| | | | 500 | 5 |
| | | | 800 | 6 |
| | | | 1000 | 7 |

EXPLANATIONS**1. DISPLAY DIRECTION**

Allows the reader to be installed facing up or down, for the LED under the display (choose "uP") or above the display (choose "dn"). The buttons keep their functions.

2. CHANNEL

This is the operating channel. The channels / frequencies table of correspondence is given in the interface manual.

The special case of channel 0 corresponds to the "frequency hopping"; the hop period is determined by parameter 27.

3. REREAD TIME

This is the time during which the tag code stays in the internal memory after its last detection. It corresponds to the minimum time during which the tag must not be detected so that it can be detected again. During this period the reader regards the tag as present in the detection area.

4. BUZZER

Confirmation or inhibition of the generation of a brief buzz at each detection of a tag.

5. INTEGRATOR CODE FILTERING

For filtering the tag codes according to the integrator code.

The value 1 corresponds to the filtering that exists on the traditional readers, i.e. the first code read after a reset of the reader becomes the reference code.

A value of 2 or more indicates filtering according to one or more codes memorised in the EEPROM memory.

These codes must be loaded by JBUS command.

6. INTEGRATOR CODE SIZE

Don't change this parameter (always equal to 3).

7. ANTENNA READ LED

For defining the behaviour of the antenna LED.

A single value is defined, which corresponds to

| event | LED |
|-----------------------|-----------------------------------|
| detection of tag | off for 1 s |
| tag battery dead | red for 0.3 s |
| functioning OK | flashing green 3 times per second |
| defective functioning | flashing red slowly |

8. TYPE OF FUNCTIONING

Enables you to choose between

- mode 0 (message generated at each detection of a new tag),
- mode 2 (message generated at each detection of a tag),
- mode 3 (mode 0 plus disappearance message).

Mode 1 is reserved for a special use.

9. FUNCTION TAGS

Permits the recognition of special tag codes with which the configuration of the reader is possible. The presentation of such a tag before the antenna enables the remote configuration of certain parameters of the reader. The function tag manages 7 to 8 parameters.

This function is available via the software version v1.1.3.

If this parameter is inhibited (=oF), all the function tags will be inhibited.

10. JOURNAL (HISTORY)

Permits the dating and timing of certain events. These saves can be read with JBUS commands or with a function tag.

11. TYPE OF RS INTERFACE

For choosing the type of RS interface: 232, 422 or 485.

This interface can be used as a host interface or a maintenance interface. If used as a host interface, choose "nu" (not used) for the OC interface (see next item).

12. TYPE OF OC INTERFACE

For defining one of the open collector interfaces in host interface.

If the host interface is the RS interface, choose "nu" (not used).

13. ADDRESS

For addressing readers connected in a network. For a single reader: do not modify.

14. RATE OF ASYNCHRONOUS SERIAL LINKS

For choosing the rate of the RS link according to the host.

15. CHARACTER FORMAT

In JBUS frame, leave in 8 bits/without parity.

In ASCII or Code Only, choose the format according to the host.

16. FRAME TYPE

For defining the message transmitted following a tag detection.

For example, for tag (0)(123)(CODE_BADGE)

In polling mode, choose JBUS

message = 01 03 0e 30 31 32 33 43 4f 44 45 5f 4b 4a 44 47 4e xx xx

In interruption mode, the choices are

JBUS: message = 02 04 0e 30 31 32 33 43 4f 44 45 5f 4b 4a 44 47 4e xx xx

ASCII: message = 1.0.123CODE_BADGE(CR)(LF)

Code only: message = 123CODE_BADGE

17. POLLING

For choosing how a tag code is transmitted to the host interface.

Polling OFF (interruption mode), the detection of a new tag generates a message that is immediately sent to the interface.

Polling ON, this message is sent only in response to the appropriate JBUS command. If the reader does not receive the command before the disappearance of the tag, the message is lost.

18. MTBM

For defining the Minimum Time Between Maintenance between two transmissions on the open collector link, whether messages for different tags or for repetitions of messages (see the next parameter).

19. NUMBER OF TRANSMISSIONS

In RS interface and interruption mode, this is the maximum number of transmissions of the same message in absence of acknowledgement.

In open collector interface, if this parameter is more than 1, each code is issued twice. The time between two transmissions is set by the previous parameter.

20. OUTPUT 1

Enables the definition of the behaviour of the output when a tag is detected.

The values are

| value | display | description |
|-------------|---------|---|
| unused | oF | |
| copy buzzer | 1 | activation for 100 ms to read a new tag |
| read 2 s | 2 | activation for 2 s to read a new tag |
| host | 3 | managed uniquely by JBUS commands |
| green LED | 4 | copies the green led of the reader base |

21. OUTPUT 2

Enables the definition of the behaviour of the output when a tag is detected.

The values are

| value | display | description |
|-----------------|---------|--|
| unused | oF | |
| BF vehicle | 1 | activation in vehicle mode (see document on function tags) |
| tag battery low | 2 | activation if the tag battery is fading |
| host | 3 | managed uniquely by JBUS commands |
| red led | 4 | copies the red led of the reader base |

The blue led is connected to output 2: to activate it you must pick display 4. In this case, the blue led will light up for a fault detection or flash when the device is powered up.

22. RANGE

Enables the user to choose between 4 range values, from 0 (minimum) to 3 (maximum).

This parameter acts on the detection threshold, while keeping the transmission power of its nominal value.

23. RESERVED

Parameter not accessible to the user.

24. ENTRY 1

Enables the user to confirm the reading of the tags with an entry signal.

In this case, if the entry is active ($6V < V_{in} < 25V$), the reading of the tags takes place, otherwise it does not.

25. ENTRY 2

To be defined

26. RESERVED

Parameter not accessible to the user.

27. PERIOD OF HOPS

Determines the time between two frequency hops in the case of functioning in random frequency hops (channel number = 0, see parameter 2).

28. READER TYPE

Identifies the model of the reader (read only).

An example of a typical configuration of the reader LMB_6023-F is given in Appendix 3.

4 INSTALLATION

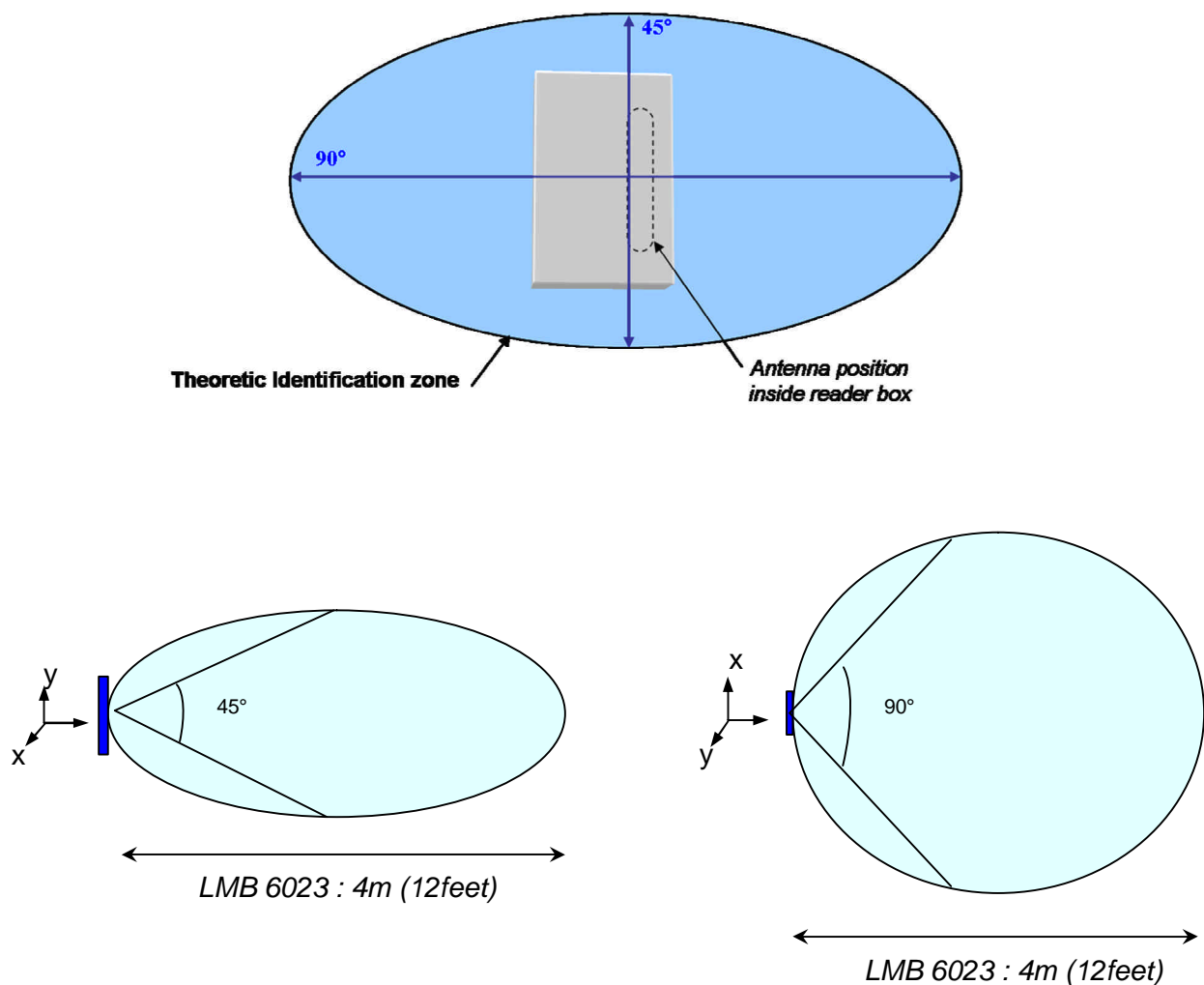
ATTENTION: Refer to the Safety Instructions for the Hyper X LMB 6023-X2 (ref 13523/52).

4.1 FIXING THE READER

Fasten the reader using the four screws available on the back metallic plate.

4.2 POSITION OF THE READER

The directivity of the antenna AT2 in the LMB 6023-X2 reader is not symmetrical $45^\circ \times 90^\circ$. So the position of the reader is important. (See diagram below)



5 FUNCTIONING

5.1 POWER SUPPLY

5.1.1 Functioning voltage of the LMB reader

The reader can be supplied with power between 12 Vdc (consumption in stabilized 1 A max.) and 24 Vdc (consumption in stabilized 0.5 A max.).

For an optimal performance of the reader in terms of reading distance, it is recommended to have a power supply the least noisy possible (ripple + noise <100mVcc).

N.B.:

The extreme limits of functioning are between 11 Vdc and 28 Vdc, so it is crucial not to go under 11 V nor over 28 V to prevent any malfunctioning or the destruction of the reader.

The value of the minimal voltage recommended for the correct functioning of the reader is 11.5Vdc. Below this level, the reader can continue to function but with its performances no longer guaranteed, functioning in failsoft mode (see functioning at voltage limits).

Inside the casing a "low voltage" LED (DT6, see §1.2 Description internal control panel) indicates that the voltage supplied to the detector is about 10.5Vdc.

When low voltage is detected, the reader activates a time out of 20 or 30 seconds. When the time out is up, the reader tries to restart:

- if the voltage is correct, it starts to function
- if the voltage is still low, it reactivates the time out, and so on

In addition, the reader is protected against polarity reversals.

5.1.2 Start-up of the reader (information relating to the internal functioning of the reader)

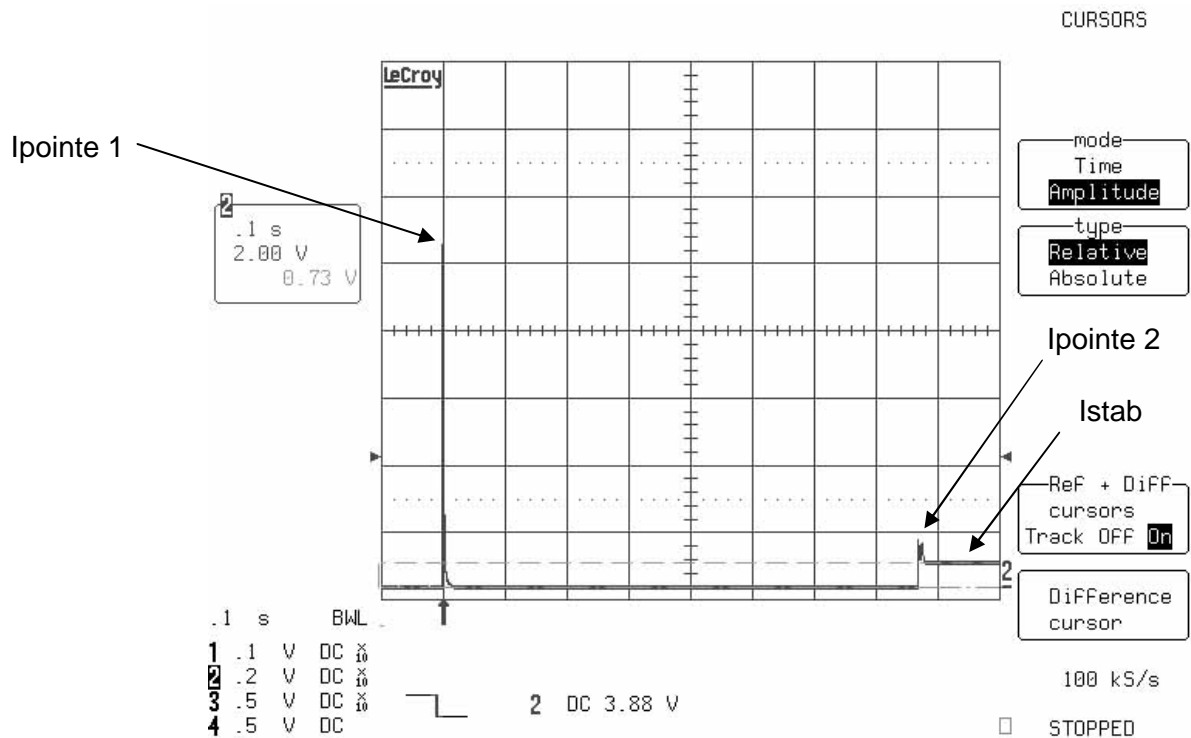
The reader starts up in several stages

- 1- When it is powered up, there is a first inrush current (Ipointe1) corresponding to the load of the condensers of the LMB reader. This inrush current is several amperes for a very short time of 5 to 10ms.
- 2- After it is powered up, the reader observes for a period the voltage available. This period lasts between 0.5s and 1s depending on the voltage input.
- 3- If the input voltage is acceptable, there is a second inrush current (Ipointe2), corresponding to the 'real' start-up of the reader. This current is lower than 1.5A with 12Vdc for a time under 100ms. If the voltage supplied to the reader is higher, this second current will be weaker (e.g. lower than 1A with 18Vdc or lower than 0.7A with 24Vdc)

Comment: Ipointe2 current is 1A typ with 12Vdc for 10 to 20 ms

- 4- Then the current of the reader stabilises (Istab) to a current lower than 1A with 12Vdc or 0.5A with 24Vdc.

Comment: typically, the functioning current is 0.6A typ with 12Vdc.



5.1.3 Functioning at voltage limits

When powered up, the LMB reader observes the voltage input before starting up. If this voltage is lower than 10.5Vdc, the 'low voltage' LED lights up and the reader starts up. The reader may have a degraded functioning until it receives a voltage input of at least 11.5Vdc.

If the reader's voltage input is lower than a minimum voltage of about 9.5V, the reader does not start up and the 'low voltage' led lights up.

If the power source used to supply the reader is too weak, the reader inrush current may lead to a lowering of the input voltage available to the reader; if this voltage becomes lower than Vmin (approx. 9.5V) the reader will stop, which will lead to a rise in the voltage available, so the reader may restart with an inrush current that will lower the available voltage and so on. To prevent this pumping phenomenon, the reader will go into sleep mode for about 20 to 30s, and try to restart when this time is up. If the voltage is correct at the end of this time, the reader starts up again, otherwise it goes into sleep mode for 20 to 30s and so on.

If the reader's voltage is higher than 28Vdc, the reader may be damaged..

5.2 POWERING UP

An auto-test is made with each power up or reset. This can be monitored on the antenna led and, if the reader is opened, on the internal displays which display successively the mnemonic of each test.

When the initialisation is completed, if the result of all the internal tests is correct, the displays switch off. Hence, in the absence of breakdown, the following events can be observed successively.

| no. | test | principal led | display | buzzer | duration |
|-----|----------------|------------------------|---------|--------|--------------|
| 1 | RAM of work | steady red | P | on | < 1 s |
| 2* | RAM Log p 0 | steady red | P0 | off | 3 s |
| 3 | RAM Log p 1 | steady red | P1 | off | 4 s |
| 4 | Checksum flash | steady red | PE | off | 1 s |
| 5 | | flashing green at 2 Hz | off | off | ad infinitum |

In fact, other tests take place but at less than 50 ms and with fugitive display. Only if the test seizes up can the display be useful.

* If the "log" parameter (10) is confirmed, i.e. different from 0, test 2 (display = P0) does not take place. In the production output, the log is confirmed by default, so at the second start-up test 2 does not take place.

The reader is equipped with an antenna with an autodiagnosis function. So an additional test is made after the autotest and a brief beep indicates that the autodiagnosis is correct. (see also the interfacing manual ref.13053/104).

5.3 READING THE TAGS

The detection of a tag provokes

- the activation of the buzzer (if confirmed),
- a record in the log (if confirmed),
- the lighting up of the leds of the reader base and of the external led as shown in the following table

| Event | Reader base LED | Blue LED |
|------------------|-----------------------------------|----------|
| detection of tag | off for 1 s | / |
| tag battery low | red for 0.3 s | / |
| functioning OK | flashing green 2 times per second | / |

5.4 SEARCHING FOR DEFECTS

ATTENTION: This operation requires opening of the case and must therefore not be performed in a sensitive zone. Refer to the Safety Instructions for the Hyper X LMB 6023-X2 (ref 13523/52).

If a defect that can lead to the breakdown of the reader is detected at a higher level via JBus requests, a test of the functioning of the reader must be carried out.

- interrupt the power supply
- remove the reader
- remove the cover
- restore the power supply

Local error codes

The search for defects is made at a higher level.

Locally (inside the reader), a hexadecimal error code indicates which test has failed (one bit per test). Depending on the type of error, the reader is or is not capable of functioning.

The table below shows all the tests and the related error bits

| no. | display | test | bit(s) of the error code |
|-----|---------|--|--------------------------|
| 1 | P | external RAM (work part) | 2 |
| 2 | P0 | external RAM (Log page 0) | 2 |
| 3 | P1 | external RAM (Log page 1) | 2 |
| 4 | PE | checksum Flash memory | 1 |
| 5 | EE | EEPROM memory | 3 |
| 6 | SC | Serial Communications Controller (SCC) | 4, 5 |
| 7 | Sn | component serial number | 7 |
| 8 | rt | component RTC (real time clock) | 8 |
| 9 | IS | RS electric interface | 6 |

Byte of the error code

| First digit | | | | Second digit | | | |
|-------------|---|-----|---|--------------|---|-----|---|
| MSB | | MSB | | MSB | | MSB | |
| 8 | 7 | 8 | 7 | 8 | 7 | 8 | 7 |

| bit | description | consequence |
|-----|--------------------------------------|--------------------|
| 1 | error checksum memory | reader unavailable |
| 2 | error external access RAM | reader unavailable |
| 3 | error access EEPROM access | reader unavailable |
| 4 | error bus SCC | reader unavailable |
| 5 | error SCC | reader unavailable |
| 6 | error interface RS | reader unavailable |
| 7 | error access component serial number | reader unavailable |
| 8 | error circuit RTC | no log time & date |

Examples

| display | meaning |
|---------|--------------------------------------|
| 04 | error access EEPROM |
| 18 | error component SCC |
| 40 | error access component serial number |

APPENDIXES

APPENDIX 1: CE CERTIFICATION

DECLARATION OF CONFORMITY



BALOGH Toulouse
105 Avenue du Général Eisenhower
31023 TOULOUSE cedex 1
FRANCE

The present declaration certifies that the LMB* device is in conformity with the essential requirements of European Directive R&TTE 1999/5/EC designed to harmonise the legislations of the Member States concerning the use of the radioelectric spectrum, electromagnetic compatibility and electrical safety.

This declaration applies to all the units manufactured in conformity with the technical documentation described in Appendix II of the directive. The evaluation of the conformity of the device with the essential requirements of article 3 R&TTE was carried out in conformity with Appendix IV of the directive and the following norms

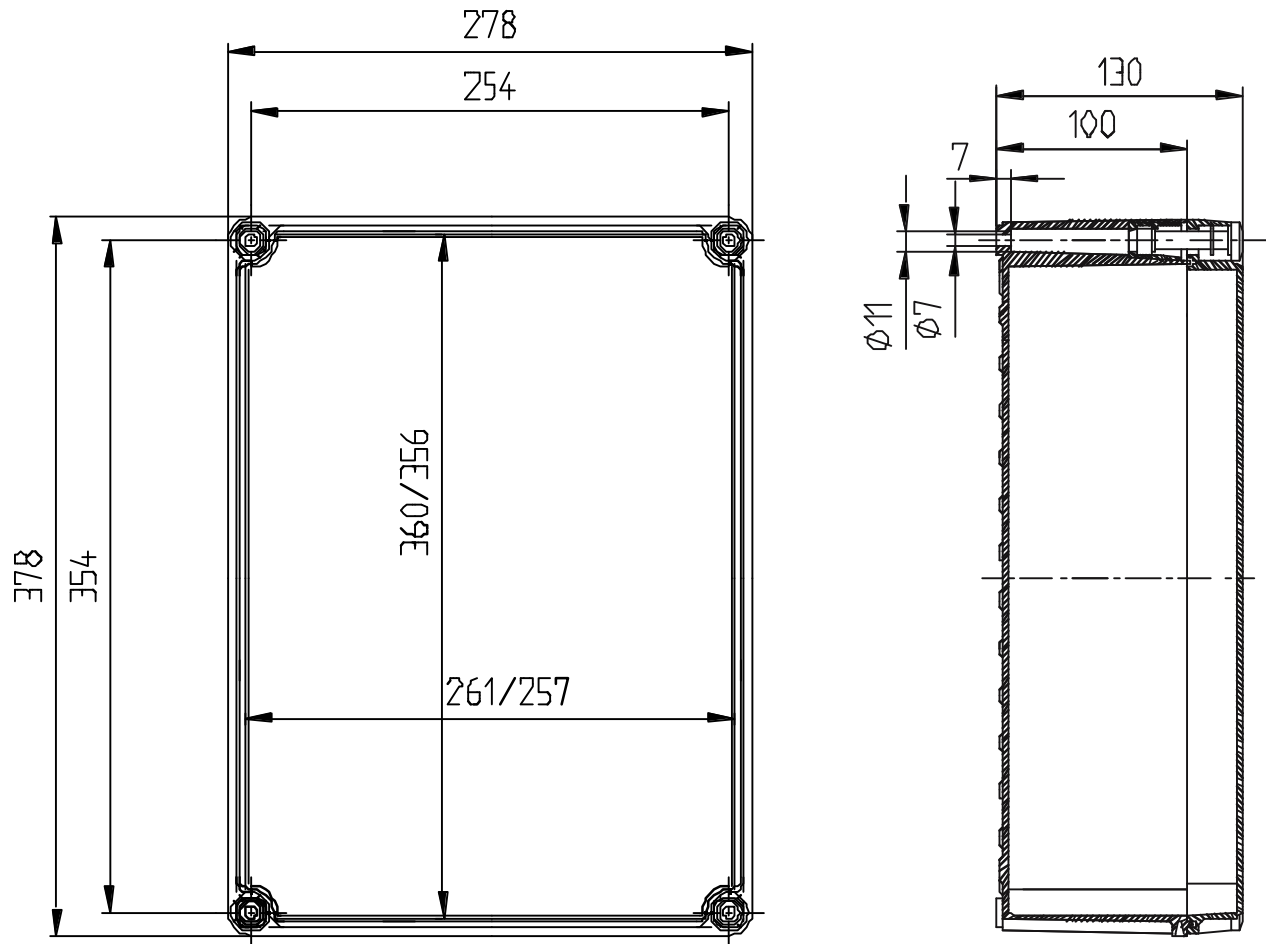
| | |
|------------------------------------|------------|
| Radiofrequency spectrum | EN 300 440 |
| EMC | EN 401 489 |
| Electrical safety | EN 60 950 |
| Exposure to electromagnetic fields | EN 50 371 |

* LMB_6012/6013/6033/6034/6035/7012/7013/7023/7033

Comment

The LMB_6023-F reader is a monoblock reader consisting of an LMB_7023 reader integrated into a casing adapted to railway applications hence the LMB_6023-F carries the CE mark of the LMB_7023.

APPENDIX 2: DIMENSIONS



APPENDIX 3: EXAMPLE OF CONFIGURATION OF THE SERIAL LINK

A typical configuration is for example one in which the parameters of the serial link have the following values:

- at physical and RS 422 level (no.11) at 9,600 bauds (no.14), 8 bits without parity (no.15),
- at protocol interruption mode level (no.17), 4 transmissions max. (no.19), with JBUS (no.16), to address 2 (no.13)

| no. | Parameter | Mnemonic | Typical value | Typical value displayed |
|-----|---------------------------|----------|-----------------------|-------------------------|
| 11 | Type of RS interface | tA | RS 422 | 42 |
| 13 | JBUS address | Ad | 2 | 2 |
| 14 | Output | br | 9,600 bauds | 96 |
| 15 | Character format | Fo | 8 bits without parity | 8n |
| 16 | Frame type | Fr | JBUS | Jb |
| 17 | Polling/Interr | Po | interruption | oF |
| 19 | Max. no. of transmissions | nE | 4 | 4 |